



Team 1923: The MidKnight Inventors

Computer Aided Design

Michael Foley

December 8th, 2014



Overview



- What is CAD?
- Programs
- Examples
- How our team uses CAD
 - Engineering Notebook
 - 3D Printing
 - CAD classes
- Questions?



What is CAD?

- **Computer Aided Design**
- Design & model 3D structures on a computer
 - Can be as simple as testing basic geometries, or as complex as creating & stress-testing an entire robot down to each fastener.
- Many different computer programs available to use for CAD
 - The MidKnight Inventors use Google SketchUp and Solidworks!

Examples



- A few great examples of other FIRST teams who use CAD as a resource:
 - 2590: Nemesis
 - 341: Miss Daisy
 - 1114: Simbotics
- By looking at their successes we can draw inspiration & better plan our own CAD process.



2590: Nemesis



- Incorporates CAD throughout their entire design & build process, utilizing mills & 3D printers to manufacture
- Their detailed documentation has brought them competition success & qualified them for design and Engineering Notebook awards

FRC2590 PRESENTS "BELLEROPHON"

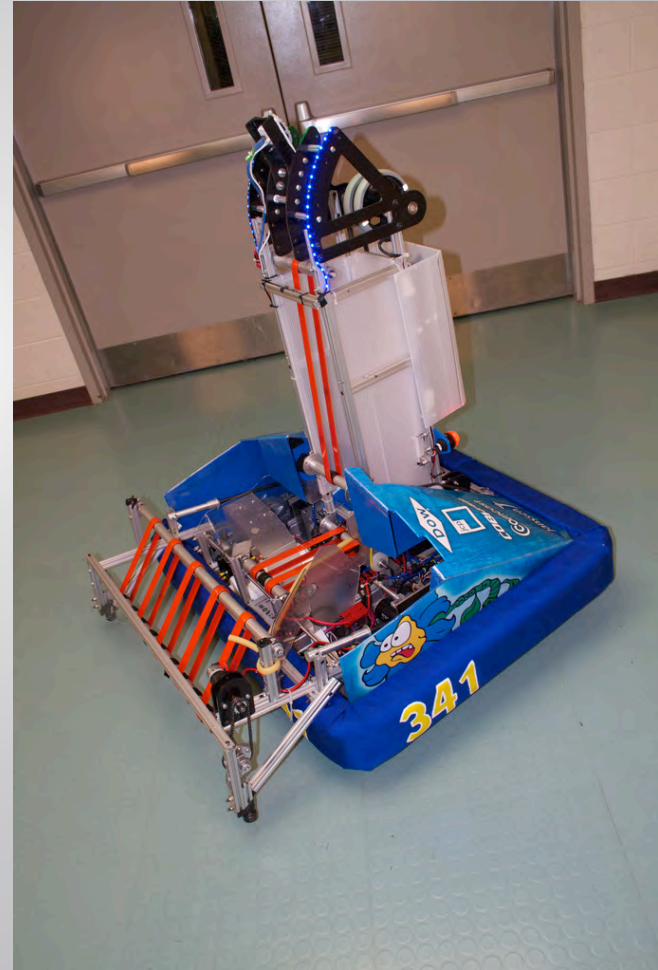
WEEK1: HATBORO HORSHAM
WEEK4: LENAPE SENECA



341: Miss Daisy



- 341 uses CAD primarily to produce the computer model to be machined, as they have a sponsor who takes on the manufacturing.
- CAD is a key step in their design process before they begin building – their build begins when the parts come back from their sponsor.



1114: Simbotics

- The design process on 1114 uses CAD enough to be able to manufacture their parts.
- They do not draw down to every small detail (fasteners etc) to save on complexity and to boost Solidworks' performance.
- Many of their design changes that happen after manufacturing do not make it back into the CAD model!





How we use CAD

- The Midknight Inventors, in the past, have used computer modeling to determine the basics of our robot – size, shape, geometries etc.
- Moving forward, we have committed to detailed CAD drawings of each robot's mechanism to supplement our Engineering Notebook and to aid us along in the design process.



Engineering Notebook



- Our notebook begins on Kickoff day with our strategic design & priority list decisions.
 - Next: Prototypes & CAD!
- All major design ideas & concepts will be modeled and rendered by the CAD subteam for use in design reviews, and as 'blueprints' for manufacturing the robot.
- **The notebook lives in the build site & is updated every day with new drawings, to-do-lists, and notes on the latest robot changes.**
 - The CAD subteam is one of the parties responsible for keeping the notebook up-to-date!



3D Printing



- This year, both The MidKnight Inventors & our FTC team (The MidKnight Magic) were granted EKOCYCLE 3D printers.
- These machines will allow us to prototype & create small parts using more accessible materials
- The CAD drawings are sent to the printer, and a few hours later you have your part in hand!



CAD Classes



- If you're interested in CAD or 3D printing, you don't need to know the programs just yet - there will be CAD classes available!
- **Dates & times TBD, but we will need to be on track before build season!**
- This documentation will be the next 'big step' in our success as a team.





Questions?